



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,879	11/04/2003	Sang-min Yoon	033808-007	3500
21839 7590 05/25/2007 BUCHANAN, INGERSOLL & ROONEY PC POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			EXAMINER ROSARIO, DENNIS	
			ART UNIT 2624	PAPER NUMBER
			MAIL DATE 05/25/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/699,879

Applicant(s)

YOON ET AL.

Examiner

Dennis Rosario

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-17, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 9 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 3/29/07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Response to Amendment***

1. The amendment was received on 4/19/07. Claims 1-20 are pending.

***Claim Objections***

2. Claim 20 is objected to for the same reasons of the office action of 2/20/07.

***Specification***

The amendment to the specification is acknowledged.

***Response to Arguments***

3. Applicant's arguments on page 14, filed 4/19/07 have been fully considered but they are not persuasive and states:

**“Applicant's respectfully disagree that Slocum teaches the facial image decision unit ‘for deriving an algorithm for deciding whether input facial images are occluded using the eigenvectors and weights of the training images, and for deciding whether the input facial image is occluded by substituting the eigenvectors and weights of the input image extracted in the facial image recognition unit into the derived algorithm.’ As recited in claim 1. ”**

The examiner respectfully disagrees since claim 1 is a system claim and the series of “for” limitations above are not given patentable weight in a system or apparatus claim.

4. Applicant's arguments on page 14 have been fully considered but they are not persuasive and states:

**"...nowhere does Slocum describe deciding whether an input facial image is occluded by substituting extracted eigenvectors and weights of the input image into a derived algorithm for deciding whether input facial images are occluded."**

The examiner respectfully disagrees since Slocum decides that the claimed input facial image is occluded or an image of "people with glasses" in col. 8, line 52 since the claimed input facial image was classified as a "type[ ] of image" in col. 9, line 27 that has people with glasses.

5. Applicant's arguments, see page 15, lines 6-12, with respect to "disguises" have been considered. However, the examiner did not address the disguises in the office action of 2/20/07 and maintains the respective rejection.

6. Applicant's arguments on page 16 have been fully considered but they are not persuasive and states:

**"Slocum does not teach 'obtaining an occluding-decision algorithm for deciding whether input facial images are occluded using eigenvectors and weights of a plurality of training images,' as recited in claim 11."**

The examiner respectfully disagrees for the same reason as paragraph 4, above.

7. Applicant's arguments on page 16 have been fully considered but they are not persuasive and states:

**“Applicants respectfully disagree that Slocum teaches ‘deciding whether the input facial image is occluded by substituting the extracted eigenvectors and weights of the input image into the occluding-decision algorithm,’ as recited in claim 11.”**

The examiner respectfully disagrees since Slocum teaches deciding whether the input facial image is occluded, via a classification as discussed in paragraph 4, above, by substituting the extracted eigenvectors and weights (represented in fig. 2 as num. 120) of the input image into the occluding-decision algorithm (fig. 2, num. 130).

8. Applicant's arguments on page 16 have been fully considered but they are not persuasive and states:

**“...nowhere does Slocum describe deciding whether an input facial image is occluded by substituting extracted eigenvectors and weights of the input image into an occluding-decision algorithm.”**

The examiner respectfully disagrees since Slocum does describe deciding whether an input facial image is occluded (by determining "types of images" in col. 9, line 28 such as "people with glasses...people with beards, people with mustaches..." in col. 8, lines 51,52 which are all various types of images with occlusion with respect to a person's face) by substituting (via an arrow upon the output of fig. 2:120) extracted eigenvectors and weights (fig. 2:120) of the input image into an occluding-decision algorithm (fig. 2:130). More specifically, a type of image is determined for matching purposes and an arbitrary image is matched to the type of image and if a match is found between the arbitrary image and the type of image then the arbitrary image is determined to be of the type of image that was used for matching purposes hence determining types of images.

Art Unit: 2624

9. Applicant's arguments on page 17 have been fully considered but they are not persuasive and states:

**“...nowhere does Slocum describe obtaining an occluding-decision algorithm for deciding whether input facial images are occluded using eigenvectors and weights of a plurality of training images...”**

The examiner respectfully disagree since Slocum does describe obtaining an occluding-decision algorithm for deciding whether input facial images are occluded (as discussed in paragraph 8, above) using eigenvectors (“eigenvectors” in col. 9, line 8) and weights (“coefficient” in col. 9, line 7) of a plurality of training images (or “training set” in col. 9, lines 2,3).

10. Applicant's arguments on page 17 have been fully considered but they are not persuasive and states:

**“...Slocum does not teach ‘deriving an occluding-decision algorithm using the extracted value of the image classes, eigenvectors and weights of the training images’...as recited in claim 20.”**

The examiner respectfully disagrees since Slocum does teach deriving an occluding-decision algorithm (via fig. 2, num. 110 that starts the algorithm of fig. 2) using the extracted value (or “particular portion of the image space” in col. 9, line 25) of the image classes (“men and women, whites, blacks, people with glasses, people without glasses, people with beards, people with mustaches...” in col. 8, lines 5153), eigenvectors and weights (or “eigenfaces” in col. 9, line 6 includes vectors and weights) of the training images (“training set” in col. 9, lines 2,3).



***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-3,7,8,11,13,14,17 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Slocum et al. (US Patent 6,430,306 B2).

Regarding claim 11, Slocum et al. or Slocum discloses a method for detecting a face, comprising the steps of:

(a) extracting (or “determined” in col. 8, line 64):

a1) eigenvectors (“eigenvectors” in col. 8, line 64) and

a2) weights (or “coefficient in the eigenvector” in col. 9, lines 7,8 is

interpreted to mean that the determined eigenvector includes

coefficients; thus, since the eigenvector was determined, the

coefficients that are included with the eigenvector are also

determined) of respective facial components from an input facial

image (or “image of a person’s face” in col. 8, line 24); and

(b) obtaining an occluding-decision algorithm for deciding whether input facial images are occluded using eigenvectors and weights of a plurality of training images (see paragraph 9, above), and

(c) deciding (fig. 2,num. 130) whether the input facial image is occluded (with respect to “people with glasses, people without glasses” in col. 8, line 52) by substituting the extracted eigenvectors and weights (corresponding to fig. 2,num. 120) of the input image into the occluding-decision algorithm (or “eigen vector projection technique” in col. 8, line 25 or see **paragraph 8** above).

Regarding claim 1, Slocum discloses a system for detecting a face, comprising:

- a) a memory unit (“database memory” in col. 6, line 38 and fig. 2,num. 140) for storing eigenvectors and weights extracted from a plurality of training images;
- b) a facial image recognition unit (fig. 2,num. 130) for extracting eigenvectors and weights of respective face components from an input facial image; and
- c) a facial image decision unit (fig. 2,num. 170: see **paragraph 3** above) for deriving an algorithm for deciding whether input facial images are occluded using the eigenvectors and weights of the training images stored in the memory unit, and for deciding whether the input facial image is occluded by substituting the eigenvectors and weights of the input image extracted in the facial image recognition unit into the derived algorithm.

Regarding claim 20, Slocum discloses a method for authenticating a facial image, comprising the steps of:

- a) extracting:
  - a1) eigenvectors and
  - a2) weights of the respective facial components (limitations a), a1) and a2) are rejected the same as claim 11, (a), a1) and a2) above) from a plurality of training images (or “training reference set of faces” in col. 8, lines 39,40 to match or map vectors of the input image and reference images) in which normal and occluded facial images are included (with respect to “people with glasses, people without glasses” in col. 8, line 52) and
- b) values (or “eigenvectors” in col. 8, line 66) of normal and occluded facial image classes to be different from each other (since the eigenvectors range from “large to small” in col. 8, line 66);
- c) deriving an occluding-decision algorithm (or “computes the principal components” in col. 9, line 3) using:
  - c1) the extracted values of the image classes,
  - c2) eigenvectors and
  - c3) weights of the training images (see **paragraph 10**, above).

Art Unit: 2624

- d) extracting:
  - d1) eigenvectors (or “eigenface” in col. 9, line 6) and
  - d2) weights of respective facial components from an input facial image (limitations d2) is rejected the same as claim 11, a2) above);
- e) deciding (via fig. 2,num. 130) whether the input facial image is occluded by:
  - e1) substituting:
    - e11) the extracted eigenvectors and
    - e12) weights of the input facial image into the derived occluding- decision algorithm (limitations e),e11 and e12) are rejected the same as claim 11,above and see **paragraph 8**, above);
  - e2) transmitting a warning message (fig. 2,num. 150) if it is determined that the input facial image is occluded, and
  - e3) deciding again (via fig. 2,num. 170) whether the input facial image is occluded; and
  - e4) rejecting authentication (via the YES branch of fig. 2,num. 170) if it is determined that the input facial image is occluded three times or more (since a determination of whether glasses were present in fig. 2,num. 130 corresponding to a first occlusion and the same glasses were determined to be present in a database of fig. 2,num. 160 in a plurality of matching images or “any records” in col. 9, line 52 corresponds to a 2<sup>nd</sup> and 3<sup>rd</sup> determination of glasses present).

Claim 13 is rejected the same as claim 20. Thus, argument similar to that presented above for claim 20 is equally applicable to claim 13.

Regarding claim 14, Slocum discloses the method according to claim 13, wherein the training images are facial images to which scaling shift or rotation change is applied (or "adjusting an inclination" in col. 3, line 45).

Regarding claim 17, Slocum discloses the method according to claim 11, wherein the occluding-decision algorithm is expressed as the following equation: (see the equation in column 12, lines 25-30. Note that the claimed equation's structure is not given patentable weight and only the variables are given patentable weight).

where  $\gamma_i$ ,  $\lambda_i$  and  $b$  are factors ("projection\_std[I]" shown twice and "proj[I]" in said equation) obtained from the training images (reference set of eigenvectors" in col. 12, line 3), and  $K(x, x_i)$  ("projection-mean[I]" in said equation) is eigenvectors and weights (or "represents the...coefficient...with eigenface" in col. 12, line 34 is interpreted as the claimed weights and eigenvectors, respectively) extracted from the input facial image.

Regarding claim 2, Solcum discloses the system according to claim 1, wherein the eigenvectors and weights of the training images stored in the memory unit are classified (by "types" in col. 8, line 50) into a normal facial image class and a occluded facial image class.

Claims 3 and 7 are rejected the same as claim 20. Thus, argument similar to that presented above for claim 20 is equally applicable to claims 3 and 7.

Claim 8 is rejected the same as claim 17. Thus, argument similar to that presented above for claim 17 is equally applicable to claim 8.

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Slocum et al. (US Patent 6,430,306 B2) in view of Huang et al. (US Patent 6,944,319 B1).

Regarding claim 12, Slocum does not disclose claim 12, but teaches:

(a1) converting ("converted" in col. 8, line 47) an input facial image into a monochrome image The method according to claim 11, wherein step (a) comprises the steps of:

(a2) detecting a facial region (via fig. 3,numerals 330 and 340) from the converted monochrome image ;

(a3) normalizing (via fig. 3,num. 350) the detected facial region;

(a4) dividing the normalized facial region into higher and lower regions; and

(a5) extracting the eigenvectors and weights (as addressed in claim 11, above) of the respective facial components using principal component analysis (PCA) (or "principal component analysis" in col. 8, lines 34,35) according to the divided facial regions.

Slocum does not teach (a4) and does not teach PCA with respect to the (a4).

However, Slocum does teach that fig. 3,num. 300 can be modified in “further alternative embodiment” in col. 13, line 61 that uses a “portion of an image of a person’s face” in col. 13, lines 62,63. Thus, Slocum suggests to one of ordinary skill on the art of “finding within a picture an image representative of a face” in col. 5, line 7 that fig. 3,num. 300 can be adapted with other methods of finding faces.

Huang et al. or Huang teaches a method of finding faces (see title) and the remaining limitations of:

- (a4) dividing (via fig. 3A,num. 304) the normalized facial region (corresponding to fig. 3A,numerals 300 and 302) into higher and lower regions; and
- (a5) extracting:
  - a51) the eigenvectors (fig. 3A,num. 318) and
  - a52) weights (fig. 3B,num. 328) of the respective facial components using principal component analysis (PCA) according to the divided facial regions.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Slocum’s fig. 3,num. 300 with Huang et al.’s teaching of figures 3A and 3B, because Huang’s teaching provides a “recognition accuracy [that] increases dramatically” in col. 4, lines 27,28.

Claim 4 is rejected the same as claim 12. Thus, argument similar to that presented above for claim 12 is equally applicable to claim 4.

Art Unit: 2624

15. Claims 5,6,10,15,16 and 19 are rejected under 35 U.S.C., 103(a) as being unpatentable over Slocum et al. (US Patent 6,430,306 B2) in view of Huang et al. (US Patent 6,944,319 B1) as applied to claim 12 above, and further in view of Moghaddam et al. (US Patent 5,710,833).

Regarding claim 15 the combination of Slocum and Huang does not teach claim 15, but Huang teaches “one standard way of performing cropping” in col. 10, lines 11,12 which suggests to one of ordinary skill in the art of cropping that there are other methods of cropping.

Moghaddam et al. teaches a cropping technique that uses a window as shown in fig. 4, numerals 304 and 310 and the remaining limitation of claim 15 of:

a) an entire facial region is divided (via said window) into the higher region centered on the eyes and the lower region centered on the nose and mouth (“eyes,nose and mouth” in col. 10, line 36).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Huang's teaching of cropping with Moghaddam et al.'s teaching of said window, because Moghaddam et al.'s teaching is “useful in the detection and recognition of...any multifeatured entity such as human faces” in col. 3, lines 5-7.

Claims 5,6 and 16 are rejected the same as claim 15. Thus, argument similar to that presented above for claim 15 is equally applicable to claims 5,6 and 16.



Regarding claim 19, Slocum of the combination teaches the method according to claim 15, wherein in step (b), it is simultaneously determined whether the facial image is occluded in the higher (corresponding to "people with glasses" in col. 8, line 52) and lower regions (corresponding to "people with beards" in col. 8, lines 52,53).

Claim 10 are rejected the same as claim 19. Thus, argument similar to that presented above for claim 19 is equally applicable to claim 10.

***Allowable Subject Matter***

16. Claims 9 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 9 and 18 are allowable for the same reasons as the office action of 2/20/07 all of which is incorporated herein.

***Conclusion***

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamaguchi (US Patent 6,608,914 B1) is pertinent as teaching a method creating data that corresponds to people with glasses (fig. 6a: WITH-GLASS) and without glasses (fig. 6a: NORMAL) wherein the data is used for face recognition in the method of fig. 5 that uses "eigenvectors" in col. 5, line 3.

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2624

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Dennis Rosario  
Unit 2624

  
MATTHEW C. BELLA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600